

NIGERIA.



# ANNUAL REPORT

ON THE

## AGRICULTURAL DEPARTMENT

FOR THE YEAR

# 1925.





# Annual Report on the Agricultural Department, Nigeria, 1925.

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## ADMINISTRATION.

1. I have been in charge of the department throughout the year, except for a period of some three weeks in January.

## AGRICULTURAL STAFF.

2. The European Staff sanctioned for the financial year 1925-26 was three Senior Superintendents of Agriculture and twenty Superintendents. The actual cadre at the end of the year is two Senior Superintendents and nineteen Superintendents. The probationary appointment of one superintendent was terminated. One superintendent retired on pension. Four new superintendents were appointed towards the end of the year. It was mentioned last year that the appointment of supernumerary officers had been approved, and it was hoped that these would constitute a margin of safety against unforeseen losses. None have however been appointed yet. By delaying the opening of work in the two new areas which were "scheduled" for 1925-26, until the end of 1925, a position has been maintained in which the staff has been more nearly adequate for the work in hand than ever before. Even so we were still short handed; and it was impossible to avoid placing some newly appointed officers immediately into positions of much greater responsibility than it is desirable to give them, until they have had a few months training while attached to a more experienced officer. It is proposed now that no more new stations should be opened during the next two financial years, so that the structure of the department, which has been greatly expanded in the last four years, may be strengthened and consolidated. By that time the first class of native assistants trained at the school at Ibadan will have had a year's experience at their work, so that it is hoped that the present inadequacy in trained native staff, which is a serious weakness in the structure at present, will simultaneously be remedied.

## RESEARCH STAFF.

3. There is one vacancy in the sanctioned staff of nine research officers, as a result of the resignation of Dr. Mason, the Senior Botanist. He resigned in order to take up a post at the new cotton research station of the Empire Cotton Growing Corporation in Trinidad. Dr. Mason did work for us which was valuable for its own results, and also because of the lead which it gave to others. Mr. Pomeroy, Senior Entomologist, has been transferred to the Medical Department, Gold Coast. Mr. Golding, previously second Entomologist, has been promoted in his stead, and Mr. Lean, a research student of the Empire Cotton Growing Corporation, who was already out here at the expense of the Corporation, has been appointed to the vacancy thus created.

## NEW FARMS.

4. *Sokoto*.—A farm has been opened at Kworre near Sokoto on land irrigated by the first canal built in this country. This little canal was built by Col. Collins for the Sokoto Native Administration. It was formally opened by the Hon. W. Ormsby-Gore, Under Secretary of State, in February 1926, when work was started on



the farm. Capt. Hewitt, M.C., Superintendent of Agriculture, went to Egypt for a few weeks, in the summer of 1925, while on leave, in order to gain some knowledge of irrigation farming, and an arrangement has been made whereby he assists the Senior Superintendent of Agriculture in supervising the work at Kworre. The knowledge he gained in Egypt is already proving most valuable. This work is as completely of a pioneering nature as any could well be, and some few years will need to be devoted mainly to experimental work, before any great or rapid extension can be undertaken. By beginning with a very small canal, and by carrying out experimental work at once, a start has been made on much sounder lines than has been possible in many countries, where irrevocable mistakes have often been made on a large scale, before experimental work was undertaken.

5. *Munshi Province*.—Towards the end of 1925 an experienced Superintendent of Agriculture—Captain Mackie, B.Sc. was transferred to the Munshi Province to tour and study chiefly the part of that province which lies to the East of the new railway. This is the only considerable area tapped by the Eastern Railway after it leaves the palm belt, which is well populated. The climatic conditions seem to be roughly similar to those of the Niger Province, and the indigenous cotton grown there is already of a useful type, from the exporter's point of view. The nature of the people, and the fact that the country has only so recently been "opened up," preclude a prospect of very rapid immediate development, but do not lessen the eventual possibilities. It has been decided that it would be unwise to open a permanent station until the lines, that will be taken by the new roads, are known, so a plot of land has been selected near Kuchia for a temporary farm. This measure will enable experiments to be made in comparing the yields per acre of American cotton and the local cotton; which is the most urgent work for this area. If there is any prospect at all of buyers coming in, a series of gazetted cotton markets will be opened in the buying season 1926-27.

#### EXPERIMENTAL WORK.

6. *Northern Provinces—Mixed Farming*.—Results obtained at the Samaru farm near Zaria, and at Kano, are distinctly encouraging. At Samaru plots of poor land treated with only one ton of farmyard manure gave an average of 1,066 lb. of Guinea corn ("on head") per acre, while the adjoining unmanured plots yielded only an average of 364 lb. per acre. Now in view of the fact that a fair average crop of guinea corn under native cultivation yields only some 1,500 lb. of grain "on head," and that there are every year many fields belonging to native farmers which yield less than 1,066 lb.; that this particular land is so poor that no native farmer would regard it as cultivable—witness the yields of 364 lb., from the unmanured plots; that 1 ton per acre, even of the very dry manure made in this country, is a very light dressing, probably equivalent to barely half the lightest dressing ever used in England; in view of these facts this result is very remarkable. There is, however, no question of the reliability of the result; and the general conclusion is supported by the results of a similar experiment at Kano. There, plots dressed with 1 ton of manure yielded, on the average, 1,200 lb. of guinea corn, as against 800 lb. average on the unmanured plots. These facts, together with the results of our efforts at growing fodder crops in mixed cropping, confirm the opinions, based on more general considerations which the agricultural officers in the Northern Provinces hold as to the eventual possibilities for mixed farming in the most northerly provinces. In the light of these results the cropping and field experiments at both Samaru and Kano have been modified, and more cattle purchased, so as to admit of a more intensive study



of the various aspects of this subject. It is hoped that it will not be very long before we shall be in a position definitely to demonstrate a complete and practical system of mixing farming suited to native agriculture. The recent introduction by the Veterinary Department of inoculation against Rinderpest greatly increases the prospects for extension work in this direction. This is the kind of work in which it will be necessary to advance step by step, making no attempt at extension work until we are sure of our ground, and then getting a very few farmers to take up our system under conditions that admit of our directing them very closely, before any wide extension is attempted. This year's work has, however, distinctly increased our confidence that eventually we shall be able to introduce a system of farming which will be a definite and great improvement on that now followed.

7. *Southern Provinces*.—The corresponding work in the Southern Provinces, in connection with green manuring continues satisfactorily.

8. *Southern Provinces—Cotton*.—The purpose and purport of these investigations has been fully dealt with in previous reports. The first stage has been completed, and certain conclusions have been reached which are believed to be sufficiently reliable to justify recording here, since they point to a clear and promising line of action. This position has been reached by the joint labours of several research officers—Botanists, Chemists, Entomologists and Mycologists—together with the agriculturists who have carried out the field experiments, and I consider that great credit is due to them all for this successful team work.

9. The most important conclusions from the investigations that have been carried out during the last three seasons are as follows:—

(a) It happens that the investigations do not cover a crop in a field of cotton that has proved a complete failure, such as occurred for instance on Moor Plantation in 1922-23. In the fields that have been studied, the chief single cause of loss has always been the internal boll rots carried by stainers. Damage from this cause is liable to vary very greatly from year to year and from one part of the country to another; and it is probable that the chief cause of the very serious failures, when they have occurred in the past, has been excessive damage by boll rots carried by stainers.

(b) The next most serious loss has been found to be that due to boll-worms; and the cause of any serious failures in the past, which have not been due to boll rots carried by stainers—if there have been any such—has probably been the attacks of boll-worms.

(c) All the investigations have shown that the bolls of American cotton are definitely much more liable to shedding and damage as a result of the attacks of stainers than are those of the indigenous cottons. The observations of the relative damage to the two classes of cotton from boll-worm attack are less consistent; but, on the whole, the American cotton appears also to suffer more damage than the indigenous cotton from this cause. In all the analyses of the factors affecting yield—those by Mason and Jones 1923-24, by Mason and Wright 1924-25, by Pomeroy and Lean 1924-25, and by Lean and Golding 1925-26—much more shedding of bolls, attacked by boll-worm, has occurred in American cotton than in native. But the figures of comparative damage to bolls as opposed to actual shedding of bolls, owing to boll-worm attack are variable; on the whole, the American cotton seems also to suffer a little more in this respect.



10. No great and certain difference has been found in the extent to which the bolls of Ishan and Meko cottons respectively are liable to be shed or damaged owing to the attacks of insects of either class; but so far as it goes, the difference, if any, seems to be rather in favour of Ishan cotton.

11. Diseases which are not carried by insects, have been found to cause less damage than those that are so carried. The indigenous cottons are, on the whole, rather more liable to such diseases than American cotton; but Ishan cotton seems to be, if anything, rather less liable to them than Meko cotton.

12. The results of the experiments in which the yields per acre from American and native cotton have been compared may be summarized as follows:—

Year.	Place.	Result.
1923-24	Botanist's Plot, Moor Plantation, Ibadan ...	Yields roughly equal.
1924-25	Plots at Oyo and Ilugun, Oyo Province ...	Native slightly better.
1924-25	Moor Plantation, Ibadan ... ..	American much better.
1924-25	Umuabia ... ..	" " "
1924-25	Okeni, Kabba Province ... ..	Native better.
1924-25	Ilorin (through Yams) ... ..	Native much better.
1925-26	Moor Plantation (through Yams) ... ..	" " "
1925-26	Adio ... ..	Native better.
1925-26	Moor Plantation... ..	" "
1925-26	Ilorin ... ..	" "
1925-26	" (through Yams) ... ..	Native much better.

(Note:—Where not otherwise stated the cotton was grown as sole crop.)

13. It is possible that in some of these experiments, a result has been obtained which is biased against the native cotton, owing to insects having been attracted to the American cotton and then having spread on to the plots of native cotton. How much importance is to be attached to this can hardly be estimated yet. It seems improbable, though not perhaps actually impossible, that this accounts for the definitely bigger yield given by American cotton on some occasions; but it may well be that, except for this factor, the indigenous cotton would have appeared more superior than it did in those experiments in which the yield of the two varieties were about equal, or in which the native cotton proved slightly superior. This factor did not affect the experiments at Oyo and Ilugun in 1924-25, for there the plots were widely separated. This separation however makes this particular result less reliable in other respects.

14. It would appear neither immediately possible, nor even desirable, that the practice of growing cotton in mixed cultivation with the other crops, especially yams, should be discontinued. For it would seem that one of the factors most favouring cotton growing in the Southern Provinces, is the fact that it is the one crop that can most conveniently be interplanted in other crops which are ripening off. For these reasons it appears that much more practical importance must be attached to those experiments in which cotton was grown through yams, than those in which fields of cotton alone were compared. In these particular experiments the native varieties have yielded very much more heavily than the American.



15. The investigations have indicated that any hope that there may be of lessening the incidence of insect and fungus by control measures, is neither great enough nor immediate enough, to affect the question of which variety we should adopt for the future.

16. The conclusion to be drawn from all the above facts would seem to be that the hope for success lies in the evolution of a strain of indigenous cotton of very high value for export. A strain of very high quality is needed, because it is evident that in some years and places the yield per acre is liable to be very low, owing to the damage done by insects; and it is only a high price per pound, which can make cotton a really attractive crop under these circumstances. In most countries the economic conditions preclude the production of very long staple cottons, because they generally yield less per acre than short stapled ones. The conditions in Southern Nigeria are exceptional in this respect.

17. Of the two indigenous cottons of Southern Nigeria—the Ishan and the Meko—the former appears to be much the more promising. No important agricultural difference has been discerned between these two varieties, which indicates that the one is likely to be safer than the other. Experiments in two seasons at Moor Plantation have shown little difference in the yield of these two varieties. In 1924-25 the Ishan yielded slightly better, in 1925-26 the Meko has done slightly the better.

18. Strains of Ishan cotton have been isolated and bred by the Botanist, which, if they can be multiplied without seriously deteriorating in the process should prove very valuable indeed for export. There is no reason to anticipate any such serious deterioration. These strains have very long lint of a very white colour; some of them have a high ginning percentage, and also, what is rather rare in such cotton, a very strong lint. The growth of one of these strains would put the whole matter of cotton growing here on a totally different footing, and would create a real prospect of expansion of cotton growing for export in the Southern Provinces. A comparison of the yield per acre of these selections with ordinary native cotton has still to be made, and too much confidence is not justified until the selection is multiplied and its yield per acre tested; but it seems very unlikely that none of these selections will yield well enough to justify its extension.

19. It is proposed that next season no American cotton should be grown on Moor Plantation except one isolated small plot of  $\frac{1}{4}$  or  $\frac{1}{2}$  acre, and that the Ishan selections should be multiplied as much as possible. No attempt will be made to test the yield this year, as seed cannot be spared for the purpose yet. But the tests of unselected native and Ishan cottons will be continued. The work at Ilorin will be much the same except that the tests will include the cotton of the Kabba province, which is allied to the Ishan cotton, but rather different in agricultural characteristics, especially in the time of ripening.

20. *Northern Belt.*—The returns of purchases for the season up to March 27th amount to the equivalent of 36,400 bales. There is still a little cotton coming in and the returns of purchases to date are not quite complete: thus it appears that the final total for the whole season will probably be about 37,500 bales. The prices paid were 2½d. and 2d. per lb., at railway stations, for first and second grades respectively, except during two or three weeks, when the prices at a few places were increased by ½d. per lb.



21. Table I, below, shows the total production of American cotton in the Northern Belt this year as compared with previous years. It will be seen that there is an increase in production of nearly 40 per % in spite of the fall in price last year, and the still lower price this year. This increase is partly due to continued extension of cotton cultivation, and partly to the fact that, in the most important areas, the weather was distinctly more favourable than normally. On the other hand, the purchases would have been probably greater, by at least 2,000 or 3,000 bales, if the price had been the same this season as last year.

EXPORTS OF AMERICAN COTTON FOR THE NORTHERN BELT  
(ZARIA, KANO AND SOKOTO PROVINCES).

Year	Bales.	Price per lb. seed-cotton 1st grade—pence.	Year.	Bales.	Price per lb. seed-cotton—pence.
1915-16	121	1 $\frac{3}{4}$	1920-21	5,405	4 $\frac{1}{2}$
1916-17	433	1 $\frac{3}{4}$	1921-22	9,483	2
1917-18	855	2 $\frac{1}{2}$	1922-23	10,774	2 $\frac{1}{2}$
1918-19	2,248	2 $\frac{3}{4}$	1923-24	15,033	4 falling to 3d.
1919-20	3,568	3 $\frac{3}{4}$	1924-25	26,692	3
			1925-26	37,500 (Estimated)	2 $\frac{1}{2}$

22. In spite of the lower price there has been more competition in buying. The cost of animal transport has risen, and that of motor transport fallen, so that now motor transport is definitely cheaper for distances up to thirty or forty miles. Another Ibadan transport contractor took his lorries to Zaria, and all have been fully employed; but there is still room for much further expansion of motor transport. Motor transport has been used for conveying seed, for distribution for sowing, to Funtua and Northern Katsina. This has been done at the expense of Government, instead of its being carried, as in the past, by the farmers themselves under the orders of the Native Administrations, or else carried at the expense of the Native Administrations. New ginneries that will be erected before next season at Funtua and Karadowa will remove the necessity for transporting much seed again for these particular areas.

23. The sealing of all bags of first grade seed-cotton was introduced this season and has proved to be a most valuable measure. Indeed, now that there are several exporters, sealing is essential. Mud walled markets have been built at most places by the Native Administrations, and are a great improvement on the matted enclosures which were used previously. No report on this year's grading has been received yet from England. The standard has been maintained at the markets, and the elimination of any subsequent substitution has probably caused a slight rise in the average grade of the exports.

24. Table No. 2 (below) shows the approximate production in the various producing areas as compared with the last two years. The figures for the present season are approximate, and are probably all a little lower than the final figures will be (see paragraph 20 above). The increase in the Zaria province is probably mainly to be ascribed to the favourable season. The increase in Southern Katsina, though partly due to the same cause, is partly due to more



intensive production, that is to a greater acreage being placed under cotton, and to that acreage being better cultivated. The extension in Sokoto is due to an extension of cotton growing within the same area of country; the producing area has not been increased. As indicated in the last report, no certain increase was anticipated in Northern Katsina, owing mainly to the general dislocation of the farming which resulted from the relapsing fever epidemic. The yield per acre also appears to have been below normal in this area, owing to the rains starting late.

				1923-24.		1924-25.		1925 to end of March, 1926.	
ZARIA PROVINCE.									
Bauchi Line	...	...	...	4,193	...	4,433	...	5,100	
West and North	...	...	...	3,560	...	5,385	...	5,420	
South	...	...	...	139	...	143	...	220	
Total Zaria Province				...	7,892	...	9,961	...	10,740
Katsina Division, South				5,510	...	10,205	...	15,750	
" " North				416	...	2,240	...	1,810	
Total Katsina				...	5,926	...	12,445	...	17,560
Sokoto Province				...	797	...	2,516	...	6,320
Kano Emirate				...	334*	...	1,531	1,620	
Daura and Kazaure				...	...	...	...	50	
Total Kano Province				...	...	...	...	...	1,670
Nassarawa (Abuja)				...	84	...	142	...	80(?)
Total...				...	15,033	...	26,692	...	36,370

\* Note. In 1923-24, 950 bales of native cotton also were purchased at Kano.

25. *Kano Province.*—No substantial increase in Kano province was anticipated this year, and this expectation has proved correct. An attempt was made to open a buying station away from the railway line, at Wudil, but no buyer tried to operate there until too late in the season. In response to our representations, the British Cotton Growing Association sent a buyer to work alternately at Daura and Kazaure, on the market days. This was very helpful and there is every reason to believe that it will result in increased production there next year. Although the purchases in the Kano Emirate are only slightly greater than in 1924-25, there were indications of increased interest in cotton this year, both among producers and buyers. Seed transported on camels at Government expense has been distributed for next season from centres in the producing areas, instead of only at railway stations. It is proposed, if there is any prospect of buyers going to them, to open six or seven new markets out in the producing areas. If buyers will take advantage of these markets, some increase in the purchases can be expected next year, and there is reason to believe that that will be the beginning of real progress in this province.



26. *Niger Province*.—The following figures indicate the production of American cotton in recent years. In this province, as in the Northern Belt, the export of native cotton has now been quite negligible for some years.

1921-22	...	...	400 bales.	
1922-23	...	...	450	„
1923-24	...	...	640	„
1924-25	...	...	1,401	„
1925-26	...	...	1,220	„ (approximate production to March 31st, 1926).

It was reported that this year a considerably increased area had been planted, and until September there appeared every likelihood of a considerably increased export. The crop, however, suffered very seriously as a result of the very exceptionally heavy rains in September.

27. *Ilorin Province*.—The purchases to March 31st, are equivalent approximately to 285 bales of indigenous cotton as against, last season, approximately 346 bales to the same date, and a total of 440. Practically all the cotton bought has come from the extreme north of the province, mainly from Bode Sadu. The yield per acre in this province was poor, owing to the excessive shedding which occurred after the very heavy rains of September. But the small purchases for export are not only due to this, but are also partly due to the fact that the prices offered for native seed-cotton for export, 1½d. for second grade, and ¾d. for third grade, were not sufficiently high to compete with the demand for the local hand spinning and weaving industry.

28. *Southern-Belt—Oyo and Abeokuta Provinces*.—The purchases, October 1st, 1925 to March 31st, 1926 amount to about 2,690 bales as against about 5,250 to March 31st, last year. A total of some 6,000 bales is anticipated, as compared to 9,925 last year. The reduction is mainly caused by the fact that practically nothing at all has been purchased at the markets away from the railway, and must be ascribed to nothing else than the lower price. It is believed that at last year's prices over 12,000 bales would have been bought. Both the acreage and the yield per acre appeared to be greater than last year, but owing to the low price offered in buying for export, the cotton will either be stored or used for hand manufacture.

#### EMPIRE COTTON CORPORATION.

29. *Seed Farm*.—A site was selected for the Corporation's first seed farm at Daudawa on the Zaria—Gusau road, in the Katsina Emirate, a few miles beyond Funtua. Two officers of the corporation have arrived and started work.

30. *Transport Experiment*.—Two half track caterpillar lorries started work at the beginning of the cotton season. They were in the charge of the Corporation's own drivers, but under the control of the Railway motor department. Various mechanical defect revealed themselves, and the lorries were only at work for a few weeks. It is understood that the defects found in the lorry with the metal track are such as may probably be easily remedied. Colonel French, C.M.G., C.B.E., Assistant Director of the Empire Cotton Growing Corporation, toured the Northern Cotton Belt, partly in company with the Deputy Director of Agriculture, and partly with me. His report will no doubt be published by the Corporation.



## COCOA EXTENSION WORK.

31. The work of the scheme of "co-operative" fermentaries, and grading and bulk sale, has again increased satisfactorily, as is shown by the following figures of the quantities handled. The figures for 1925-6 will still be subject to slight revision. The details of this scheme have been fully explained in previous reports.

## COCOA FERMENTING—EXTENSION WORK.

	1922-23.	1923-24.	1924-25.	1925-26.
	tons.	tons.	tons.	tons (approx.)
Ibadan District ... ..	19½	36	66½	123½
Ilesha „ ... ..	55½	176	363	400
Ife „ ... ..	5½	72	160	195
Total Oyo Province   ...	70½	279	589½	718½
Abeokuta ... ..	...	7	15	25
Ijebu Ode ... ..	...	...	3¾	30
Ondo ... ..	...	...	73	150
Ado Ekiti ... ..	...	...	...	10
Total ... ..	70½	286	681¼	933½

The premium gained for this cocoa as compared to F.A.Q., was not quite so good as last year, for it averaged only about £4 10s. per ton over an average F.A.Q. price of £24 15s. as against last year's average premium of £5 10s. over an average F.A.Q. price of £27 per ton (Ibadan Prices).

32. The original object of this scheme was not only to teach the native farmers how to ferment, and that it pays to do so; but to demonstrate to the whole trade, merchants and manufacturers, the quality of cocoa that ordinary native farmers can produce if they are paid a proper premium for it. For this high price to be widely recognised, even 1,000 tons a year is hardly enough, and it is anticipated that when the quantity is greater, and this grade of cocoa better known, still higher premia will be obtained for it. Already the operation of this scheme, together with the fact that one or two firms, but especially the "Cocoa Manufacturers Ltd." have consistently offered small premia for ordinary fermented cocoa, has resulted in the raising of a very considerable proportion of the crop of the Oyo province, not indeed up to the "special" or "Government" standard, but up to the grades, "good fermented" and "fair fermented" which are the best ordinarily recognised in the West African trade. Consequently the general inferiority of the Oyo cocoa as compared to that of the Agege district, a difference which was notorious before 1922, is fast disappearing.

33. *Benin Province.*—A fermentary was first opened at Benin three years ago but progress was very slow. The producers had for years been disappointed at their inability to get a fair price for their cocoa. In many cases they had not harvested their crops, and had allowed their plantations to revert to bush. They had, moreover, lost faith in the Agricultural Department which had originally advised them to plant cocoa and they were inclined passively to resist attempts to help them. On the other hand, the



local buyers took little interest in a crop of such small dimensions, and had sometimes been disappointed in the quality of their purchases. Absence of competition also increased our difficulties in this area. All this has now changed. Our assistance has been specially requested by growers: neglected fields are being cleared; and the buyers have offered a better price—£30 a ton this year as against £20 last year, in spite of the Liverpool prices being lower this year than last. Even this year a certain definite measure of success has been achieved (*vide* the table below) which reflects great credit on Mr. Gilbert, the officer in charge of the farm. Considerable progress is expected next year, and steady progress thereafter. Quantitatively the results may seem petty but this work will eventually be important, for, cocoa farmers encouraged by finding a market for produce, have started planting cocoa again.

1924-25.				1925-26.		
Place.	Dry Cocoa	Price per ton.	Premium over F.A.Q.	Dry Cocoa	Price per ton.	Premium over F.A.Q.
Benin ...	2 tons 3 cwt.	£18—£20	—	7 tons 12 cwt.	£30—£30½	£3½—£4½
Olumoye ...	—	—	—	3 tons 10 cwt.	£30 —£30½	£4 —£5
Ogbese ...	—	—	—	1 ton 1 cwt.	£30—£30½	£4 —£5

34. *Eastern Provinces.*—The statements that have been made in the last paragraph in regard to Cocoa fermenting extension work in the Benin Province apply to a great degree also in the Eastern Provinces. This season 11½ tons have been handled under this scheme by the staff attached to the Umuahia station, as against 7½ tons last season.

#### OIL PALMS AND PALM PRODUCTS.

35. There are five major lines on which work has been carried out in connection with the oil palm and its products, (1) small scale processes for extraction of oil by native extractors (2) kernel extraction and separation from shell (3) factory process for oil extraction (4) improvement of palmeries (5) the study of the varieties of palms.

36. *Small Scale Extraction.*—The object in this work is to try to find a method of extraction which will be an improvement on the ordinary village processes, but which will not involve the use of any but the simplest apparatus. Mr. Barnes, the chemist working on oil products, had evolved two distinct processes, the “modified native” process and the “cooker and press” process. During the year both have been thoroughly tested and demonstrated, one after the other, in a selected representative village, Loburo, in the Abeokuta province. The Alake took a practical interest in the matter, and both he and the villagers seem to appreciate our desire that they should give these processes a fair trial, and take them or leave them, according as they saw fit. Indeed the attitude of the villagers was most satisfactory, for while extremely critical, they were yet keenly interested.

37. The “modified native process,” described in the 3rd Annual Bulletin, is one which involved the use of no imported apparatus at all. But the village tests indicated that, although this process is a slight improvement on the old native processes, its



comparative advantages are altogether too small to permit any real hope of its general adoption by village extractors. It will be realized, from the accounts published in the Department's bulletins, that this subject—the attempt to evolve an improved process involving no imported apparatus at all—has been investigated very thoroughly. It was never thought, even at the beginning, that the chance of success was very great; but the economic importance of a success, if such could be achieved, was clearly such as to justify every effort. It is now considered that everything possible in this direction has been done, without success in the economic sense. This line of work will be discontinued.

38. "*Rapid*" *Cooker and Press*.—In view of the probability of the failure of the "modified native process," Mr. Barnes undertook to attempt to work out an improved process which would only necessitate the use of imported apparatus of a minimum cost and degree of complication. Especially were any machines with revolving parts to be avoided. Whether the process which has been evolved will actually be taken up by native extractors, is questionable. It may well prove that the cost of the apparatus, modest as it is, is yet so great as to outweigh the advantages of the process. But, so far as it goes, the process is successful in that it effects a marked improvement in the quality and quantity of the oil extracted; the total labour required is at least not substantially increased, and the apparatus is relatively simple and cheap. By this process about 60% to 65% of the oil in the pericarp is extracted as against 45% to 50% by native processes and 85% or more, by the Factory process. There is no difficulty in preparing, by the cooker-press process, an oil of 5% F.F.A. content.

39. The apparatus consists of two parts, a simple cooker (costing £15 in England) in which the fruit is heated for an hour under a pressure of a few ounces of steam, and a hand press (costing £25) for treating the pericarp after it has been removed from the nuts by beating in a mortar and hand-picking. It is not essential that both parts should be used. Fruit can be heated in the cooker, more effectively and with more economy of fuel and water than by simple boiling, and then may thereafter be treated in the ordinary native style. Full details of the apparatus and process are being published in the annual bulletin for this year. When it appeared that the "modified native" process would not be taken up, demonstrations of the "cooker and press" process were carried out at the same village and the apparatus lent to the people for some weeks for trial. The women extractors there appreciated the labour saving advantages of the cooker, but considered the pressing to be too hard work. The quantity and quality of the oil extracted proved as satisfactory as at Moor Plantation (*see* figures above). There is reason to hope that conditions in the Eastern Provinces will prove more favourable to this innovation than in Oyo or Abeokuta, and demonstrations will accordingly be carried out there. It is not considered that any great confidence in the eventual general adoption of this apparatus is yet justified, but every effort will be made to have it given extended trials.

40. *Nut cracking and Kernel recovery*.—Mr. Barnes has been testing the various hand nut cracking machines on the market, in the hope of finding one which is suitable for general recommendation. None of the several tried are considered to be sufficiently satisfactory to be recommended at present; but it is hoped that by co-operation with the makers one of them may be improved. It is doubtful if machines actually operated by hand will ever be taken up, but it would seem just possible that there may be a profitable opportunity for small native capitalists, in buying nuts and cracking them in machines driven by very small oil engines. The use of a

mud bath for separating the kernels from the shell, has also been tested. This method seems to be as satisfactory as the brine bath used in factories at present, and naturally is more suitable for the native extractor. An account of this work is being published in the annual bulletin.

41. *Factories.*—The proposals mentioned in Sir Hugh Clifford's last address to the Legislative Council for the formation of an Association, similar to the British Cotton Growing Association, to establish pioneer factories, seems to be meeting with but little response; Government therefore is now considering other possible means of attracting commercial enterprise in this direction. Meanwhile Mr. Barnes has continued his attempts to improve details of the factory process, with considerable success. Some of his results have been published in the "Second Special Bulletin," some still remain to be published. His process for the refinement of oil by passing it through a centrifugal of the cream separator type (described in the Second Special Bulletin) has proved very successful in continued routine use. It would seem that this system, in addition to its value for factories, may also prove useful to ordinary exporters of native made palm oil, especially if bulk shipment becomes common.

42. *Improvement of Palmeries.*—A full statement of the position in regard to the cultivation of oil palms in Nigeria, as it appears to me, is being published in the annual bulletin for this year. It seems that a palm grown from the beginning under "plantation conditions," i.e., on cleared and weeded ground, bears much earlier, and bears much more, in its early years, than a "wild" palm; but that a "wild" palm, which has once been stunted by the competition of other plants in its early years, never recovers under cultivation. Once a trunk has been made at all, the "wild palm," even though its trunk be only a foot high, can never equal a real "plantation" palm, however well it be cultivated in later years. As the wild palm grows, the presence or absence of bush around it makes less and less difference, until when the palm is more than 30 feet high, it seems to make little or no difference whether the bush be cleared away or allowed to grow to a height of 15 feet. The real problem in the improvement of the "cultivation of palms" in Nigeria, is thus the problem of inducing the farmer to "cultivate" them continually during the early years, especially the first seven or ten years, of their growth. From a practical and economic point of view, this is not a simple problem. As regards palms in farm lands and ordinary bush, the Agricultural Department is carrying out field experiments at Benin and Umuahia. It has not yet been possible to conduct direct trials or demonstrations in connection with the improvement of the "palm groves" in the Eastern Provinces, because the department has no such grove with which to experiment. The possibility of obtaining control of some groves was recently considered at a conference between officers of this department and representatives of His Honour the Lieutenant-Governor, Southern Provinces. The extended practical application of any conclusions that may result from such work would hardly seem to be possible under the present native customs of strictly communal exploitation of the groves. This matter was also considered by the committee and suggestions put forward for trying to introduce individual rights of occupancy. The difficulties are undoubtedly very considerable.

43. *Varieties of Oil Palm.*—The results of the plantings of oil palms of the various varieties, chiefly at Calabar, have shown that none of them breed true, as might be expected in a plant where cross fertilization is common. Varieties will thus only be fixed through self fertilization and selection on the so called



"Mendelian" lines. This process takes at least three generations, and as in the oil palm, each generation means about seven years, it will be a long while before varieties that will breed true can be fixed. A satisfactory technique for selfing oil palms has been evolved. In the meanwhile, records of the yield of fruit of individual trees in the fields of planted palms at Calabar have been maintained since 1922; and these, with chemical examination of the fruit, will yield reliable information as to which is the most profitable variety, and also provide superior parent trees for breeding. But the trees in each plot are irregular in height—as a result of irregular germination. Owing to the varieties not breeding true, the trees in each plot are mixed. For these reasons, and because of the voluminous nature of the records, it will need an officer to devote his whole time for two or three months to this work alone, to condense the records into simple and reliable comparative figures. I have been hoping, for the last twelve months, to be able to spare an officer for this purpose, but I have not yet been able to do so. I fear now that we shall not be able to undertake this work for six or nine months more. Progeny rows from individual parent trees at Calabar have been planted at Benin and Umuahia, which, when they come into bearing, will indicate more reliably, the best individual trees to use as parents. All this work, if steadily continued, as we propose to do, may prove to be of economic value in some thirty years' time.

#### GROUNDNUTS.

44. In the season 1924-25, statements were commonly made that the quality of the early purchases of ground nuts were inferior, owing to their being prematurely lifted; and it was suggested that instructions should be given through native administration officials, to dissuade farmers from harvesting before a fixed date. I could not support this proposal, partly because of my aversion, on general grounds, to any "instructions" about farming being broadcast through Native Administration officials, partly because of the well known fact that all fields are not by any means planted simultaneously, and therefore do not ripen simultaneously, and partly simply because we had not enough knowledge of the subject to justify any instructions. Early in the season 1925-26, Mr. Barnes was therefore transferred to Kano, taking apparatus with him for fitting up a temporary laboratory to study this matter and others affecting the ground nut crop.

45. A summary of his report has been submitted for publication in the Trade Supplement, and his full report will appear in this year's annual bulletin. His chief conclusions are:—

(a) Early lifting, within any reasonable limits, does not affect the commercial quality of the nuts at all.

(b) The poor quality of some consignments of early nuts is simply due to the fact that some buyers, in their haste to sell or export their purchases, bag up their nuts before they are dry. Nuts that have been so treated are easily recognised.

(c) Apart from this special cause of inferiority in a few early consignments, the differences between the free fatty acidity content and rancidity of the oil, from different parcels of decorticated groundnuts (groundnut kernels) are due to the varying proportions of split and pulverised kernels. For whereas a whole groundnut kernel only deteriorates slowly on keeping, small broken pieces deteriorate somewhat rapidly, the rate doubtless depending on the nature of the climate in which they are kept. Commercial samples generally contain from 25% to 65% of whole kernels.



46. According to the results of work done by women under the observation of the Superintendents of Agriculture at Kano and at Ilorin, it appears that, however hurriedly and carelessly the work is done, some 25% to 30% of kernels escape breakage. On the other hand, women, taking all possible care and working under close supervision, seem unable, by this method, to keep the proportion of the whole kernels higher than 60% to 65%. The extra trouble of producing the 60% grade instead of the 25%, is quite small. A grade of 100% whole kernels can be obtained by the rather tedious method of breaking the shells in the fingers, as is done for seed for planting: at Ilorin a grade of 80% whole kernels has been extracted by beating the nuts with a mallet on a hard floor; but it is still doubtful whether there is any rapid process (except of course the use of machines) yielding a high percentage—say 95%—of whole nuts. This matter will be further studied. There is reason to believe that if an adequate premium were offered for a 95% grade, the native grower would find a way of producing it. Probably the premium would not need to be very high; but we do not yet know what premium is commercially possible. This point also will be investigated.

#### RICE HULLING FACTORY.

47. Enquiries have been made into the possibility of encouraging rice production in the valley of the Sokoto river by the erection of a hulling mill. At Sokoto, paddy, yielding about 70% of clean rice, generally costs about 0·4 pence per lb. It is estimated that the cost price per lb. of clean rice delivered at Gusau would be as follows:—

	pence.
Paddy to yield 1 lb. of rice ... ..	·57
Hulling ... ..	·25
Bagging, in 20 lb. bags ... ..	·18
Transport 130 miles at 1s. per ton mile	·70
	<hr/> 1·70

48. Imported rice in 20 lb. bags costs about 3d. per lb. f.o.r. Lagos and the selling price rises to about 4d. per lb. at Zaria. In 1924, 7,403 tons of rice valued at £145,695 were imported. Of this quantity about 25% was imported through Lagos, and the remainder into the Eastern Provinces. There is already a surplus of paddy at Sokoto in most years, and a very small trade in paddy actually takes place between Sokoto and Zaria. Production in the Sokoto Province is already capable of expansion, and very rapid expansion will be possible when inundation canals are constructed to control the irrigation. For, at present, some fields are flooded too deeply and others get too little water: thus every year some crops fail almost completely owing to either the one cause or the other, according to whether the floods are high or low. Again there is little doubt that experimental work at Kworre will lead to greatly increased production per acre, through the introduction of superior varieties, obtained either by importation from other countries or by local selection. For any such progress, factory hulling is essential. Trade to other parts of the country is not possible on any large scale if the rice has to be hulled by hand.

49. The experience of other countries, while encouraging confidence in the success of machine hulling, shows that there is little hope of success with hand-power machines, and that very small power-driven plants are not generally satisfactory. Samples of Sokoto rice were sent to a firm of manufacturers of rice machinery, and the question of suitable machines was taken up with them by the Deputy Director of Agriculture, when he was on



leave. A suitable factory, large enough to run on its own waste as fuel, would cost about £4,000 inclusive, and would turn out about half a ton of cleaned rice per hour.

#### TRAINING OF AGRICULTURAL ASSISTANTS.

50. The school of Agriculture at Moor Plantation, Ibadan, is progressing satisfactorily, though under difficulties for want of accommodation, and also for special staff. The teaching and general management of the school, so far as European staff is concerned, is entirely undertaken by the technical and research officers of the department as a side-line to their ordinary duties. To a moderate extent this arrangement is not objectionable but the present complete reliance on it is satisfactory neither for the teaching nor for the performance of the officers' proper duties. Such makeshifts have been adopted during the last three years, in preference to asking for adequate provision for the school, because it was considered preferable to gain some experience and make some progress first, so that when that adequate provision was asked for, it might be well adjusted to the requirements. Proposals for a permanent school building and for the appointment of a European Schoolmaster have recently been put forward.

O. T. FAULKNER,

*Director of Agriculture.*

Ibadan,

April 17th, 1926.

